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India needs to set a new conservation agenda for mahseer

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Historical misidentification, release into wrong areas as well as dam construction, all are imperilling this most iconic of Asia's freshwater fauna



Well-known UK angler, Gary Newman with a large *Tor tor* from Pancheswar on the Sarda River. Gary has caught and returned unharmed mahseer in excess of 40 pounds, of four different Indian species. Photo: Gary Newman

During the most recent broadcast of *Mann Ki Baat* by Prime Minister Narendra Modi, he detailed the discovery of a remarkable fish. "Meghalaya is home to a rare species," he said. The blind mahseer is one of several Indian species of this most iconic of Asia's freshwater fauna and, currently, the world's largest subterranean fish.

My colleague, India's leading fish taxonomist Rajeev Raghavan from the Kerala University of Fisheries and Ocean Science, was involved in assessing this fish and declared that it had many similarities with the golden mahseer, *Tor putitora*.

He cautions that “the genetic analysis is not complete and relying on morphology alone has resulted in several, historical mis-identifications.”

Daniel Harries of Heriot-Watt University, Scotland, the leader of the cave study and subsequent paper said: “We have a fish that is more than 10 times bulkier than other species of cave fish.”

The study of the ecology of wild mahseer is an area that lags behind other biological studies. “This throws up all sorts of questions such as what food source sustains them. We don’t have any clear answers for this yet; it is all very intriguing.”

This echoes PM Modi’s words: “The more you know, the more you realise the magnitude of what you do not know.”

Particularly in regions like India's North East, where there are several species of mahseer that are not described, or mis-identified, sometimes with devastating ramifications.

Gain one, lose two?

Even as we celebrate what is either a new species, or one well down the evolutionary route to speciation, we face losing others. Rampant and unbalanced development, along with unregulated releases of various native and non-native fish place pressure on vulnerable species including the International Union for Conservation of Nature (IUCN) red listed — ‘endangered’ — golden mahseer.

Recently, I was given access to a set of data starting in the mid-1980s, through to 2015, from a series of large-scale surveys of fish population and diversity.

These studies were carried out on the Gandaki River of Nepal by the Peace Corps programme, with Emporia State University professor David Edds, initially, and then David Gillette, associate professor at University of California, Asheville, with local field biologists in support.

This data paints an alarming picture for one species of mahseer, probably *Tor tor*; the fish from which the entire genus takes its name.

In common with many species, we have to rely upon the original painting by 18-year-old Bengali artist, Haludar, who provided the illustrations for British colonial naturalist Francis Hamilton's book on the Ganga river fishes, and the accompanying taxonomic description by Hamilton, for identification.

Since the publication of *An Account of the Fishes of the Ganges*, 200 years ago, there have been multiple errors of identification, compounded by repetition, to the point where only a comprehensive study in type localities can correct these discrepancies.

What we can say is that this fish is in catastrophic decline. This is just one study on one tributary of the Ganga basin, but anecdotal evidence says that numbers are falling in others.

Worse, in places where these fish are to be found, there appears to be no recruitment; populations are of large, old fish, with an apparent loss of spawning success.

This mirrors the decline of the largest mahseer of all, the hump-backed mahseer (*Tor remadevii*) of the Cauvery river. A poor spawning season was compounded by pressure from several decades of unregulated release of a different species of mahseer.

The mighty hump-backed mahseer never had a chance to re-establish itself and is now red listed as ‘critically endangered’, a status only one step away from extinction.

Luckily for the hump-backed mahseer, a team of scientists and field researchers from the Mahseer Trust, Bharathiar University in Coimbatore, Wildlife Association of South India and Coorg Wildlife Society managed to unpick the decades-old identification problems for this fish.

Once done, it was able to gain an IUCN Red Listing, opening up conservation possibilities. *Tor tor*, is currently listed ‘data deficient’ due to the identification issues, so no conservation plan can be prepared until the identity can be positively and correctly resolved.

Setting agendas

For fish like *Tor tor* and the blind cave mahseer of Meghalaya, we must embrace the opportunity to discover more about them before it is too late.

“Send in your suggestions on lending more substance to this opportunity,” Modi told citizens at the end of his address. This is only part of the required agenda. Unfortunately, large scale, sometimes illegal activities are going on all around the Ganga and Brahmaputra basins where these fish live.

For a highly migratory fish like *Tor tor*, the massive dam construction project on the Sarda / Mahakali river at Pancheswar on the India-Nepal border, will surely spell the end of any hope that these fish may produce offspring.

Given that India is a net over-producer of electricity and that the Nepali side of this catchment has suffered four consecutive years of drought due to falling groundwater, this dam presents problems for fish and people alike.

In a country which, according to Modi, has a “boundless love for nature. All this is a part of our cultural heritage”, what biological cost is too high to pay for another intervention in a river’s natural process?

I mentioned earlier about mis-identification of fish in the North East. The Biodiversity Action Plan of Nagaland discusses stocking mahseer into the Tizu river, a tributary of the Irrawaddy that flows into Myanmar.

The native species there is called *Tor yingjiangensis*, another little-known mahseer and one easily confused with *Tor putitora*. Given that we have known for more than 150 years about the

impacts of moving mahseer into places they should not be — *Tor putitora* taken to Bhimtal Lake in the Kumaon Hills in the 1850s wiped out the native ‘lesser mahseer’ *Naziritor chelynoides* — we cannot argue that such measures are taken in innocent ignorance.

We must follow Modi’s sage words: “our biodiversity is a unique treasure”, and set a new conservation agenda.

Steve Lockett is Education and Outreach Officer at the Mahseer Trust

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NEXT STORY

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Wetland flora help maintain ecological balance and need to be conserved. However, only 68 wetlands are protected in India so far

Wetlands in India are facing an ecological imbalance. Uncontrolled siltation; discharge of waste water and industrial effluents; denudation of aquatic vegetation; aquaculture; construction of dykes, dams and seawalls; discharge of pesticides, herbicides, etc; and filling for solid waste disposal — these are some of the major threats to wetlands.

Wetlands are a distinct ecosystem flooded by water. Its aquatic vegetation makes it different from other aquatic bodies.

Aquatic system flora helps maintain ecological balance by interacting with their environment in numerous ways, and therefore, their management is crucial. So far, only 68 wetlands are protected in India. Thousands of other wetlands that are biologically and economically Olympian have no legal status.

Flora vegetation

Aquatic (fresh-water) vegetation — which grows around streams, rivers, lakes, etc — has more ecological significance than sea-water vegetation. The former maintains water quality by filtering out nutrients and sediments.

They also play a role in the food web. Seeds or tubers found in fresh-water ecosystem are consumed by waterfowl species. Many plants enter the food chain as detritus, which are small

plant particles formed after decomposition of plants and are subsequently consumed by invertebrates.

Fresh-water vegetation, thereby, serves as a breeding ground for aquatic and terrestrial fauna. It provides nesting areas to migratory birds. They help prevent erosion and stabilise soil.

Wetlands flora can broadly be classified into submerged water plants, floating water plants, emergent water plants and riparian water plants.

Submerged water plants are 100 per cent under water, and provide food source for native fauna and habitat for invertebrates. They also possess filtration capabilities.

Floating water plants are found in slow-moving water and have small roots. They are a source of food for avian species. Emergent water plants grow above water with their roots submerged in marsh localities. Surrounding trees and shrubs found along the edges of wetlands or other water bodies are called riparian water plants.

The marine ecosystem comprises deltas, coral reefs, mangrove forest, lagoons, sea grass beds, etc. Seaweeds and seagrass are the major plants found in sea-water.

While seaweeds are primitive, marine non-flowering plants (algae) without roots, stem and leaves, seagrass are flowering plants that grow in shallow coastal waters and estuaries.

Urchins and fishes feed on seaweed, which also provide shelter to fishes, invertebrates and mammals. Large seaweeds can form dense underwater forests, called 'Kelp forests' and act as underwater nurseries for marine animals such as snails and sea urchins.

Seagrass, on the other hand, require sunlight for photosynthesis. Less than 60 species globally, they help maintain water clarity by trapping fine sediments and particles with their leaves and help prevent soil erosion. They provide habitat for many fishes and invertebrates. Seagrass and other organisms that grow on them are a food source for many marine animals.

Mangroves, which are part of marine ecosystem, serve as breeding, feeding and hiding place for fishes, crabs, oysters, prawns, etc. Apart from protecting the coastline from erosion, they control floods also. Halophytes act as salt extractors and reduce soil salinity.

The road ahead

To maintain ecological equilibrium, it is crucial to maintain wetlands. The problem, however, is that India's wetlands have not been delineated properly so far.

The Ministry of Environment, Forests and Climate Change, is primarily responsible for the management of wetlands. Effective coordination between the different ministries such as energy, industry, fisheries, revenue, agriculture, transport and water resources is essential for protecting these ecosystems.

Only the wetlands that come under the Protected Area Network have management plans. Their active monitoring over a period of time is essential. Comprehensive inventory of all wetlands involving the flora, fauna and biodiversity, along with direct and indirect values, should be prepared. There is no special legislation to protect these ecosystems.

An environmental impact assessment plan needs to be highlighting threats to these ecosystems and formulating corrective measures. As wetlands are common property with multi-purpose utility, their protection and management need to be a common responsibility.

An appropriate forum to resolve existing issues needs to be set up. All relevant ministries need to allocate sufficient funds for conserving these ecosystems. Awareness among the general public, educational and corporate institutions must be encouraged to achieve sustainable success in protection of these wetlands.

Microwave remote sensing tools play an important role in applications relating to wetland monitoring and vegetation assessment. Microwave sensors are highly sensitive to moisture content and textural properties of vegetative cover. They can be used to discriminate between grasses, aquatic vegetation, forest and crop cover.

Encroachments can be identified. Unmanned Aerial Vehicle (UAV) technology can be tried for monitoring wetlands. Remote sensing data in combination with GIS methods are effective tools that have been used to delineate the open water habitat with aquatic vegetation in Keoladeo Ghana National Park in Bharatpur.

It is high time that earnest efforts are taken on scientific basis for better management of flora of wetlands.

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